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## ABSTRACT

2                   Apparatus is provided for introducing a consistent series of small and  
3                   localized rotary impacts to a PDC bit during drilling, to improve PDC drill bit  
4                   performance. Rotary impact supplements the nominal torque supplied by the rotary  
5                   drive thereby avoiding lockup and potentially damaging energy storage in the drill  
6                   string following windup, should the bit slow or hang up when drilling in difficult  
7                   formations. The apparatus comprises a rotary hammer which is rotated about a bit  
8                   shaft's anvil, preferably by a drilling fluid driven turbine. As the hammer rotates,  
9                   potential energy is built up. When the hammer and anvil connect, the energy is  
10                  released into the bit shaft and thus into the bit, increases its instantaneous torque  
11                  and allows it to more effectively cut through difficult formations.